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## Journal of the Society of Arts.

FRIDAY FEBRUARY 21, 1862.

### INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,500, have been attached to the Deed.

Guarantors holding ivory tickets for visiting the building are informed that those tickets are no longer available.

### WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

On the 12th of February, at noon, the building was delivered over by the Contractors to Her Majesty's Commissioners. Although much remains to be done before it may be called entirely completed, it is sufficiently advanced to admit of the reception of those goods which must necessarily be on the spot at once. Already a few cases have been received, the first arrival in the building being a collection of raw materials from Liberia. St. Helena has come in a close second, with some very similar packages; these, of course, will remain as yet unpacked until the northern courts are finished.

The glazing and painting of the domes are going on as quickly as possible, and are so far advanced as to promise an early completion. Last week, for the first time, the whole of the eastern dome rested entirely on its own supports. It is satisfactory to be able to add that the deflection in the columns, which was expected to amount to four inches, nowhere reached a greater extent than half-an-inch. As soon as the glazing and decorating are finished, the removal of the scaffolding will immediately commence, a process which will occupy some time, but which must necessarily be finished before the flooring underneath can be constructed.

The men are at work on the flooring of the northern courts, and the staircases admitting to the galleries all over the building are nearly finished. The contractors have put up several stoves in the picture galleries, in order to thoroughly dry and ventilate them before the pictures come in.

The refreshment courts are being plastered, and the floors of the upper story are laid. The contractors for refreshments, both foreign

and English, are understood to be making great exertions to supply the requirements of the public.

Immediately after the building was placed in the hands of Her Majesty's Commissioners, a body of police took possession. A corps of commissionaires, specially raised for the occasion, are installed to act as messengers and general attendants, and the authorities at the War-office have placed at the disposal of Her Majesty's Commissioners a company of Royal Engineers, who are already busy at work marking out the spaces which have been allotted to English exhibitors.

Although the staff of Her Majesty's Commissioners do not come down to the building until next week, several of the officials are already on the spot, and a number of temporarily constructed offices are occupied by them in the Southern Courts. Among them are Mr. R. Thompson and Mr. P. C. Owen, the British and Foreign Superintendents, besides several of the Superintendents of Classes.

Her Majesty's Commissioners have placed the question of Juries entirely in the hands of Dr. Lyon Playfair, as Special Commissioner, who occupied the same position in the Exhibition of 1851. This important branch of organisation, which has hitherto been somewhat delayed, will now be proceeded with as rapidly as possible. The manner in which it has been decided that the Juries should be selected will be at once understood from the following decision which has been lately published:—

#### DECISION XI.

"Prizes or rewards of merit, in the form of Medals, will be given in sections I., II., III."

- (a) These medals will be of one class, for Merit, without any distinction of degree.
- (b) No exhibitor will receive more than one medal in any class or sub-class.
- (c) An International Jury will be formed for each class and sub-class of the Exhibition, by whom the medals will be adjudged, subject to general rules which will regulate the action of the Juries.
- (d) Each Foreign Commission will be at liberty to nominate one member of the Jury for each class and sub-class, in which staple industries of their country and its dependencies are represented.

Her Majesty's Commissioners have resolved that an industry shall be ranked as a staple one which has 20 exhibitors in a class, or 15 exhibitors in a sub-class.\* But Her Majesty's Commissioners will give to each Foreign Commission the alternative of sending a specified number of Jurors, determined by the experience of past Exhibitions, and by the relative spaces allotted to the several countries.

- (e) The names of the Foreign Jurors must be sent to Her Majesty's Commissioners before the 10th of March, 1862. At the same time, the class or sub-class on which each Juror is to serve must be specified.

\* In the nomination, each sub-class is to be considered a separate Jury. Should it happen that a Foreign Commission is not represented by 15 exhibitors in any of the sub-classes of a general class, the fact that they have an aggregate of 20 exhibitors in the whole class would not entitle them to a Juror. The sub-classes will act as separate Juries, only to be united for confirmation of awards, and for general purposes of administration.

- (f) The British Jurors will be chosen in the following manner:—

Her Majesty's Commissioners will take steps to secure a certain number of Jurors on behalf of India and the colonies; and every exhibitor in the United Kingdom will propose the names of three persons to act on the Jury for the class in which he exhibits.

From the persons so named, Her Majesty's Commissioners will select the requisite number of Jurors.

- (g) The names of all the Jurors will be published in April, 1862.
- (h) The Juries will be required to submit their awards, with a brief statement of the grounds of each, to Her Majesty's Commissioners before the 15th day of June, 1862.
- (i) The awards will be published in the Exhibition Building, at a public ceremony.
- (j) They will immediately afterwards be conspicuously attached to the counters of the successful exhibitors, and the grounds of each award will be very briefly stated.
- (k) If an exhibitor accepts the office of Juror, no medal can be awarded in the class, or sub-class, to which he is appointed, either to himself individually, or to the firm in which he may be partner.
- (l) The medals will be delivered to the exhibitors on the last day of the Exhibition.

The *Empress of the Seas*, which was burnt off Port Philip, we now learn by later advices had no Exhibition goods on board; but the *Orient*, which has been damaged by fire, has on board 85 packets of South Australian goods, including wine, flour, barley, native woods, jams, copper and other ores, malachite, slates, oil paintings, photographs, and shells. Other vessels are also on their way from the same settlement with mixed cargoes of native produce for the Exhibition, such as soap, wool, and dried plants.

The province of Nelson, New Zealand, has shipped a valuable collection of coal specimens, cloth, wool, gold, timber, hops, photographic views, and samples of furniture made from native woods, the very names of which would make the fortune of advertising upholsterers. Red Manuka chairs, Totara couches, and Ti-tree tables, to say nothing of many other productions, ought really to create a new sensation.

Tasmania is determined to be well represented in the forthcoming display, and she has, therefore, not only shipped some fine specimens of anthracite coal and iron ores from her vast coal fields, with topazes, polished marbles, furs, skins, fine fleeces of wool, and models of native fruit, but she is going to erect a trophy in the building—a column nearly one hundred feet high, made of native woods, capped with the flag of the colony, and surrounded at the base with ornamental woods worked up into models of whale-boats and whaling apparatus. This column will have a winding staircase inside, and will doubtless be a leading feature of the Exhibition.

Queensland, a young Australian colony of scarcely two years' growth, has shipped a full collection of cotton, maize and wheat, coal and

copper, wine, wool, tallow, oil, and honey, models of ships, stuffed animals, birds, and preserved insects, blocks of marble, native woods, and photographs, with dresses made from native cotton and wool, and a number of aboriginal ornaments and implements.

From New South Wales we shall get a fine-art display, consisting of oil paintings, water-colour drawings, photographs, works in the precious metals, pottery, specimens in fancy bookbinding, music publishing, and cabinet and leather work. The textile fabrics sent will include native cloths and lace; and the minerals, coal, copper ore, iron, gold, and fossils. The settlement has also shipped a quantity of agricultural produce, some valuable native woods and wines, samples of sugar, wool, tallow, hides, and preserved beef, and also some soap, candles, and blacking. The Colonies evidently mean business at the Exhibition, and will display the useful quite as much as the beautiful.

On Saturday next the offices of Her Majesty's Commissioners in the Strand will be finally given up, and the only Western Central office where season tickets for the Exhibition can be obtained, on and after Monday next, will be at the house of the Society of Arts. A calculation has been worked out, showing that each three guinea ticket, if fully used by its holder, will admit on occasions when the separate payments for admission would amount to nearly £21.

A Sub-Committee has been appointed in England, with the view of collecting for Exhibition productions of Italian Art, consisting of the following gentlemen:—

Marquis D'Azeglio, *President*; J. C. Robinson, Esq.; M. Digby Wyatt, Esq.; R. Redgrave, Esq., R.A.; E. Oldfield, Esq.; D. Colnaghi, Esq.; J. B. Heath, Esq., Consul-General for Italy; the Baron Marochetti; the Count Certi, and the Prince Butera.

Henry Graham, Esq., has been appointed Commissioner in London to represent the interests of Italian exhibitors.

#### THE BRITISH TEXTILE DIVISION. INTERNATIONAL EXHIBITION OF 1862.

As nothing has been said at present about the prospects of this important section of the coming exhibition, it is gratifying now to report that there is every promise that the display will be of a very practical and useful character; and whilst our continental friends will, probably, "hold their own," as respects the more ornate fabrics, we shall show that the arts of design have not stood quite still, even in the commoner articles of every-day use, whilst in those tissues in which sound make, excellent dyes, and perfect finish are essential, the advance will be proved to be unmistakable. The class of cottons will receive its strongest contributions from Glasgow, Manchester, as in 1851, having scarcely made any effort worth naming. Singularly enough, whilst this industry represents almost one-third of our exports, the two classes within which it is comprised, classes 18 and 23 (the latter for prints only) will be the two smallest displays of the textile division. Perhaps the present condition of trade may have something

to do with this. It is, however, pretty certain, that if ever we are to have a really national exposition of this department of industry, we must not rely upon its being got up by the manufacturers themselves.

In woollen and mixed fabrics there will certainly be a more satisfactory series of exhibits. Bradford shows in a collective form. Huddersfield, Halifax, and Leeds take a similar course in the classes to which their products belong. Glasgow follows its movement in cottons, by showing moderately in Class 24, lace and embroidery; and most effectively in mixed fabrics, in Class 21. Paisley and Norwich, together with Dublin, will keep up each its old reputation, and the space for these seats of industry, the objects shown being varied in colour and texture, has been so arranged in the plan as to come nearest to the eastern dome; and as the whole of the textile division is in the south galleries, and in fact occupies the whole of the available space in that locality, it is intended that this portion, at all events, shall be made as effective as possible, and yet in keeping with the general result of the arrangements.

The heavy woollens, tweeds, &c., of Scotland, with the blankets of Witney and the flannels of Rochdale, will occupy less prominent but excellent positions in one of the cross galleries, the lace being placed in the other. Here Nottingham takes an important post, and there is every promise that the results will be highly satisfactory, alike as regards design and execution. The products of lace for the metropolitan market will also make an important display here.

The silk manufacturers are to be placed against the north wall of the picture gallery, thus getting a purely north light; a great desideratum, as a large amount of valuable material is soon spoiled in positions in which it cannot be defended effectively from the sun. It is expected that the arrangements in this class will be of one uniform character throughout, London, Manchester, and Macclesfield combining for this purpose. With one or two exceptions all the best houses will be well represented. Coventry will contribute its ribbons, but not to any great extent.

The linen manufacture follows silk in this gallery, and the staple of the north of Ireland and some parts of Scotland will be efficiently represented. The Belfast Local Committee, too, have organized a trophy for the great nave of the building.

In the gallery which leads from the back of the picture gallery to the eastern dome, the class for clothing is placed, and the arrangements will commence with the feet, in a display of boots and shoes, and pass gradually and systematically up to the head, finishing at the dome with hats. This class has unfortunately needed a great amount of "weeding out," as claims were made for space which could not be complied with, except at the expense of more important industries; for, after all, the art of the tailor and milliner is so thoroughly the slave of fashion, that unless a great amount of space could be commanded, the more fixed industries had, of necessity, the prior claim.

It is satisfactory to know that the arrangements of the textile department, which have again been undertaken, as in 1851, by Mr. George Wallis, are in a state to give every facility to the exhibitors in fitting-up their space at once. The general plans were completed, and the allotments in plan, collective and individual, were all sent out, except in a few unimportant instances, by the day Her Majesty's Commissioners had possession of the building. On the following day, the 13th, the marking off of the spaces on the floors of the south galleries, was commenced, in order that the precise position of each exhibit may be defined; and, as a final matter, the catalogue for the whole division was fully revised in proof by Mr. Wallis, as an official reference during the arrangements. As a matter of interest, it may be stated that the exhibitors' space for textiles comprises a nett amount of nearly 18,000 square feet of floor, independently of all passages, and the vertical space occupied will probably amount to 100,000 square feet more.

## ROME AND THE INTERNATIONAL EXHIBITION OF 1862.

The correspondent of the *Daily News* writes:—"In my letter of the 15th January I gave a brief account of the contributions to the sculpture gallery of the London Exhibition, which are being dispatched from Rome. Having then described the works sent by Gibson, Story, Harriet Hosmer, Spence, Gatlif, and Shakespeare Wood, I shall now mention those of the remaining English and American sculptors of eminence. Among the most original will be considered Mr. Rogers's *capo d'opera*, the bronze gates intended for the Capitol at Washington. Like the Gates of Paradise at Florence, the bas-reliefs on the panels of these doors constitute a continuous history, and Mr. Rogers has, with excellent taste, chosen his nine subjects from the life of the great discoverer of America; the large semi-circular space on the summit being occupied by the triumphant figure of Columbus planting the standard of Spain on the Island of San Salvador. The door-posts and lintel, the rails and styles of the doors, are also enriched by beautiful sculpture of arabasques, intermixed with heads of the historians and statesmen of America. The bronze casting of this fine work has been executed at Munich, in a superior style, and of a deep golden-coloured bronze, which must produce an exceedingly rich effect.

"John Adams sends a statute of a boy playing at the favourite Roman game, still in common use, though described so long ago by Ovid in his 'Elegia de Nuce':—

"Quatuor in nucibus, non amplius, alea tota est  
Cum sibi suppositis additur una tribus."

"Macdonald's contributions consist of a mendicant and a bacchante. I cannot but regret he has not added another of his works—an angel kissing a sleeping child. A beautiful statue is the Diana of Mr. Cardwell. He has treated admirably a subject which modern sculptors have rarely attempted, albeit it was as great a favourite among their predecessors as Venus or Apollo. The noble figure—no mere nymph, but a stately goddess—is preparing to descend into the bath, languidly leaning backward meanwhile in an attitude of great repose and grace. The face has a soft and dreamy expression, such as actually suggests the thoughts of moonlight, and well befits the celestial Luna, the goddess lover of Endymion. The same artist has already sent to England, for exhibition, a group representing the mythical form of the venerable adage, *Omnia vincit Amor*; in other words, Cupid conquers Pan. The contrast of the graceful limbs of Love, and the brutish form of the Satyr, is very fine in an artistic point of view, but the subject is less pleasing than Diana. The Americans, who so warmly hail on all occasions the talents of their countrymen, will rejoice to see two national works by Mr. Mozier—an Indian girl celebrated in the early history of the colonies, and a young lady that was long lost among the Indians, and was at last restored to her parents, and who is well known in American romance as 'The Wept of the Wishton-wish.' Besides these, Mr. Mozier sends a group of the Prodigal Son and two statues,—one of Queen Esther, the other of Jephtha's Daughter."

## TENTH ORDINARY MEETING.

WEDNESDAY, FEB. 19TH, 1862.

The Tenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 19th inst., Thomas Sopwith, Esq., F.R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Andsley, Geo. Ashdown. { 1, Canning-chambers, South  
John-street, Liverpool.

Armstrong, Walter .....	69, Aldermanbury, E.C.	Whitmore, Wm. Fred....	16, Bishopsgate-street Within, E.C.
Beaumont, John A. ....	14, Cornhill, E.C., and Wimbledon-park-house, Wimbledon, S.W.	Wilson, George .....	59, Threadneedle-street, E.C., and 23, St. Mary's-road, Peckham, S.E.
Beckley, Robert Whittingham .....	5, Ludgate-street, E.C.	Wood, Humphrey Williams .....	11, Denhigh-place, Belgravia, S.W.
Brown, David .....	13, Bucklersbury, E.C.	Wood, James Templeton, M.A. ....	24A, Gresham-street, E.C.
Capel, James .....	5, Throgmorton-street, E.C., and 62, Westbourne-ter., W.	Wright, Anderson .....	29, Great St. Helen's, E.C.
Chandler, Thomas .....	1, Bank-buildings, E.C.	<b>The following candidates were balloted for and duly elected members of the Society :—</b>	
Clode, Nathaniel .....	73, Avenue-road, Regent's-park, N.W.	Bally, Otto .....	(Messrs. Arles Dufour & Co.), 41, Threadneedle-st., E.C.
Coles, Wm. Fletcher ...	5, Aldermanbury Postern, E.C.	Cameron, Capt. W. Ogilvie.	Langbourne-chambers, 16½, Fenchurch-street, E.C.
Conisbee, Walter .....	18, Webber-street, Blackfriars-road, S.	Cave, Rev. Thos. Wells...	53A, City-rd., Finsbury, E.C.
Coombs, Thos. Merriman...	13 & 14, Ludgate-st., E.C., and Clapham-common, S.	Dowson, Joseph E. ....	38, Dowgate-hill, Cannon-street, E.C.
Craddock, John Chase .....	16, Bishopsgate-st. Within, E.C.	Groombridge, Henry .....	5, Paternoster-row, E.C.
Curtis, Robt. M., LL.D. ....	6, The College, Doctors'-commons, E.C.	Groombridge, Richard ...	5, Paternoster-row, E.C.
Dahlke, Julius G. ....	Hereford-lodge, Old Brompton, S.W.	Hodgkinson, S. ....	43, Threadneedle-street, E.C.
Daw, George Henry .....	57, Threadneedle-st., E.C.	Hooper, B. ....	43, King William-st., E.C.
Dixon, Thomas Ogden .....	Steeeton, <i>via</i> Leeds	Judson, Henry .....	10, Scott's-yard, Bush-lane, E.C.
Drew, Richard .....	9, Mincing-lane, E.C.	Killy, C. O. ....	52, Bread-st., Cheapside, E.C.
Eamsonson, Joshua James...	11, Dowgate-hill, E.C., and 2, Richmond-terrace, Hackney, N.E.	Lambert, Henry T. ....	74, Grosvenor-street, W.
Engall, Thomas .....	15, Euston-square, N.W.	Mavor, William .....	77A, Park-st., Grosvenor-sq. W.
Foster, William Watson ...	157, Fenchurch-street, E.C. and Felling Chemical Works, Newcastle-on-Tyne	Meeson, Richard .....	Duvals, Gray's, Essex, and 8, George-yard, Lombard-st., E.C.
Garland, Robert ....	Belfiori-lodge, Highbury, N.	Mourant, Edward .....	Samarès Manor, Jersey.
Gibson, Henry .....	113, Lower Thames-st., E.C.	Noble, George .....	4, George-yard, Lombard-st., E.C.
Gladstone, W., F.R.G.S.	57½, Old Broad-street, E.C.	Noble, Joseph Alfred ...	4, George-yard, Lombard-st., E.C.
Gray, John William .....	114, Fenchurch-street, E.C.	Ponton, T. Fox .....	163, Cheapside, E.C.
Grimswade, Charles .....	3, New Earl-street, E.C.	Worth, Charles Jones ...	City Bank, Threadneedle-street, E.C.
Harris, Henry .....	34A, Moorgate-street, E.C.	<b>The Paper read was—</b>	
Harrison, John .....	2, George-yard, Lombard-st., E.C.	<b>ON THE RELATIVE MERITS OF THE DIFFERENT SYSTEMS OF WORKING METALLIC MINES AND COLLIERIES.</b>	
Hayward, T. Carlyle, jun.	3, Highbury-park North, N.	By H. C. SALMON, F.G.S., F.C.S.	
Henderson, Henry .....	1, Gutter-lane, Cheapside, E.C.	The relation between the industrial and political greatness of these islands and their mineral resources is too evident to require pointing out. Without our coal and iron—our copper, lead, and tin—our present industrial position would have been unattainable by any amount of skill or enterprise.	
Hills, Thomas Hyde .....	45, Queen Anne-street, W.	Among the mineral resources of Great Britain, coal and iron occupy by far the most important position, their value (estimating the coal at its price at the pit's mouth, and the iron as pig-iron) having been, in 1860, nearly seven and a half times as great as that of the produce of all the metallic minerals put together, estimating this metallic produce at its value after being smelted. The exact values were :—Coal, £20,010,674; pig iron, £12,703,950; total value of coal and iron, £32,714,624. Value of metals produced from metallic minerals, £4,406,694, including copper, tin, lead, zinc, silver, and other miscellaneous metalliferous products.	
Howes, M. H. ....	The Elms, Bedford-park, Croydon, S.	But although the produce of our metalliferous mines seems small in comparison with that of our great coal and iron districts, it is not only still considerable in itself, but its value to the industry and trade of the country is even greater than appears from the figures at first sight. The annual out-turn of metalliferous minerals, producing metals to the value of four millions and a half, is not only a direct addition to the wealth of the country to that extent, but, coupled with our other mineral resources, it has had the effect of making this country the great centre of certain	
Hudson, G. F. ....	23, Bucklersbury, E.C., and Borough-heath, Epsom.		
Jerrard, James Thurgar	163, Fenchurch-street, E.C.		
Johnstone, William .....	48, Gresham-street, E.C., and Ladywell-cottage, Lewisham, S.E.		
Jones, Richard .....	30, Botolph-lane, E.C., and 1, Belmont-vil. Richmond, S.W.		
Killick, Joshua Edward	7, Ludgate-hill, E.C.		
Lukyn, Edward .....	35, New Broad-street, E.C.		
Macdonald, Alexander ...	3, Rotunda-place, Aberdeen.		
Munday, Charles .....	86, Snow-hill, E.C.		
Norbury, John .....	5, Throgmorton-street, E.C., and 30, Gordon-sq., W.C.		
Ogston, George Henry ...	22, Mincing-lane, E.C.		
Parfitt, William .....	2, Stanhope-pl., Mornington-crescent, N.W.		
Payne, Charles .....	56, Old Broad-street, E.C.		
Porter, Robert .....	12, Billiter street, E.C.		
Shakespeare, William .....	10, Austin-friars, E.C.		
Smith, James .....	69, Coleman-st., E.C., and 21, Duke-street, Edingburgh.		
Southgate, John .....	76, Watling-street, E.C.		
Stapleton, Jas. E., jun. ...	62, Cannon-st., E.C., and Mayville-lodge, Lee-park, S.E.		
Tomlin, James .....	Haringay-park, Hornsey, N., and St. John-square, Clerkenwell, E.C.		
Walker, Thomas Collier.	Saint Luke's Hospital, E.C.		

branches of metallurgical industry—a metallurgical metropolis, so to speak, to which ores are sent from every quarter of the globe, upon which our commercial and metallurgical industry realise their due profits.

In taking a brief review of the systems of working by which these great sinews of British industry are discovered and wrought, so as to be available for our use, which I propose doing this evening, I need scarcely say that I shall studiously avoid details, and confine myself, as nearly as possible, to giving a popular exposition of the general principles upon which the practical working of metallic mines and collieries is carried out, so far as the time at my disposal will permit me to do.

In comparing the modes of working metallic mines and collieries it is necessary, in the first place, to consider the main distinguishing conditions under which the mineral deposits occur in either case. It will be sufficient, for my present purpose, to refer to two of these. The first, as to the position, with reference to their containing rocks, of the lodes or beds in which the minerals sought occur; and the second, as to the distribution of the minerals in these lodes or beds.

Now, as to the first point, the position of the lodes or beds, with reference to their containing rocks, it may be laid down, as a statement of a general fact, in this country at least, that the combustible minerals occur in beds approximately horizontal, interstratified with other beds; while the metalliferous minerals occur in lodes generally vertical or inclined at a considerable angle to the horizon, usually cutting through the rocks which they traverse. Beds of coal and its allied minerals are, in fact, sedimentary deposits contemporary with their containing rocks, while metallic lodes are of an origin long subsequent to their containing rocks, and are due to causes which science has yet failed to elucidate. I need scarcely say that, in stating that deposits of combustible minerals usually occur in beds approximately horizontal, and the metalliferous minerals, on the contrary, in lodes more or less vertical, I only profess to give a popular notion of their common mode of occurrence in this country. In numerous localities, particularly on the Continent, beds of coal are thrown, by the contortions of the strata, into positions more or less vertical, and metalliferous deposits, on the other hand, sometimes take a position nearly horizontal, and even, at times, are found in beds interstratified with their containing rock.

The second distinguishing condition—that is, the different modes in which the minerals sought for are distributed in their beds or lodes, is, in the cases of coal and the metalliferous ores, even still more characteristic than the first, for it is connected with their geological origin. The combustible mineral, being of sedimentary origin, partakes of the comparative regularity of such deposits. The metalliferous ores, on the other hand, having been introduced into the rocks long subsequently to their formation by the operation of geological causes, highly obscure and, probably, equally complicated, usually occur with an irregularity which has hitherto defied the ingenuity of man to reduce to any general laws, and which has rendered this class of mining so eminently speculative. This distinguishing condition of comparative regularity in the one class of mining, contrasted with the widest capriciousness of distribution in the other class, stamps the mode of working to be adopted, in either case, with distinctive features, which must be always borne in mind if we wish candidly to compare the respective merits of the two systems. In metallic mines, where the deposits of valuable ores occur so irregularly—but which deposits, when found, are so valuable—the primary object is research. The removal, in the most economical manner, and with the least waste, of the ore discovered, is, of course, an important consideration; but it is decidedly secondary to the proper prosecution of works of discovery. In collieries, on the other hand, works of research are of secondary importance, the primary object being the economical and safe removal of as large a proportion as possible of the coal, the quan-

tity of which is approximately known in most districts. Having a pretty large acquaintance with the various mining districts of the United Kingdom, and of some foreign countries, I have been greatly struck with the very different type of character which is required for successfully carrying out metallic mining and colliery mining. In the one case the essential problems to be solved are quasi-geological; in the other they are mechanical and engineering. The true metallic miner acquires, by constant practice, coupled frequently with a certain natural aptitude, an instinct—it really is but little else, being indescribable and undefinable—for the search for metallic ores, which has a value beyond all price. The possession of this acquisition is quite compatible with a general confusion of ideas on any other subject; and, in fact, it is not unfrequently developed in the highest degree in men who possess anything but clear minds—who, indeed, are quite incapable of sustained reasoning. In many metallic mining districts I have observed two types of men, the result of whose career has been very different from what a cursory observer might expect. The one would be a man of large mind, considerable abilities, and an accurate reasoner. Such a man would be an excellent engineer and a good man of business; his works, under and over ground, would be laid out skillfully and economically, and the cost of everything would be known to a fraction; yet, through a long life of industry, he would be found decidedly unsuccessful. The other would be a man of a confused mind, rarely capable of giving a reason for what he did; a bad engineer and a muddling man of business. The mechanical appliances and arrangements in the mine, and at the surface, would be badly and wastefully laid out; and as to knowing the cost of the respective operations, you would generally find that the notion of estimating them had never entered into his head; yet this man would be successful where the other failed—the reason being that he possessed that peculiar mining instinct which the other, notwithstanding his superior general ability, was deficient in. The want of a clear mind, and the absence of business capacity and engineering skill, are no doubt drawbacks, but they are trifles in comparison with the possession of that indefinable knowledge, which will enable one man to discover rich bunches of ores, where the chances are the other will wholly fail. In prosperous metallic mines the courses of ore are so rich—when found—that even a considerable per-centage of cost in breaking the ore and bringing it to the surface is not so very material. The great point is to find the ore, and the man who can do that best is fittest to manage a metallic mine, even if, in making the ore available when found, he should spend fifty per cent. more than another.

These reasons, the force of which are not, I think, generally appreciated, coupled with the great uncertainty and irregularity of all metalliferous deposits, will, I believe, always render metallic mining inferior in its mechanical dispositions to colliery mining. Except in some extraordinary exceptional cases, it is very rare indeed that we can see our way for more than five years. An extensive mining sett may, of course, be worked successfully for scores of years, but this will generally be by a series of new discoveries, each usually requiring distinct working appliances. Consequently, as mining is a business pursued for the purpose of making money, prudent men hesitate to incur large expenses or outlays of capital for the object of making a small saving on the working of a deposit of ore, which may itself disappear in the course of a short period.

**UNDERGROUND WORKING OF MINES.**—The systems of underground working, in metallic mines and collieries, thus depend upon two principal causes—the angle which the beds or veins make with the horizon, and the regularity or otherwise of their mineral contents. Indeed, the latter condition is of very general application, for all mineral deposits may be classed, for the purpose of working, according to the amount of sterile or gangue matter they

contain, which may be used for the purpose of filling up, to some extent, the excavations made by workings, so as to support their walls or roofs. In the case of metallic mines, the proportion of this sterile matter is generally sufficient, with the aid of a certain proportion of timber, to secure the walls of the lodes sufficiently, particularly when the dip or "underlie" of the lode is such as to aid their standing. In the case of collieries, where the bed of coal is generally nearly horizontal, and where, besides, it consists wholly of valuable mineral, any attempt to remove the whole, or even a great portion of this, must be accompanied by a fall of the roof. Consequently, the difficulty of working collieries, so as to secure a considerable proportion of the coal, and at the same time to avoid accidents; to keep the works open, and not to prejudice the working of other parallel seams; is much greater than those unacquainted with the subject would be apt to suppose. Indeed, in the whole range of the art of mining, there is no problem so difficult, and certainly none more important. Controversies have raged on the subject, and wide diversities of opinion and practice still exist, and probably ever will exist. For my own part, I have little faith in any general rules, as applied to the carrying out of operations of this nature. The conditions vary so widely, in different districts and different mines, that it is only natural to expect a corresponding variety of practice; and, after all, it is only the judgment and experience of the manager that can properly decide what mode is best applicable to his own works.

The drawing on the wall will give a general idea of how the underground workings of metallic mines are carried out. In the first place a shaft is sunk from the surface, either on the inclination of the lode, or vertical, so as to intersect it at a given depth. From this, levels are extended on the course of the lode, generally at regular intervals, varying from 10 to 15 fathoms, for the purpose of exploration. At certain intervals in these levels, generally from 20 to 40 fathoms apart, small interior shafts, called "winzes" in Cornwall, Devon, and in portions of Wales, and "sumps" in other districts, are sunk from level to level, partly for the purpose of exploration, and partly for the purpose of ventilation. When the ground is "laid open" by these levels and winzes, any ore ground met with is worked away, the stuff being allowed to fall into the level beneath, whence it is trammed to the shaft and drawn to the surface. The excavations left by the removal of the ore-ground are secured by timber, and the poor and waste part of the lode. The working away of ore-ground in metallic mines, consequently, rarely presents any real difficulties. When the lode is very large and rich, or when the rock containing it, or the "country," as it is technically called, is soft or "heavy," the working is sometimes attended with trouble, and always with considerable expense for timber. But there are rarely any serious difficulties, and on the whole the working away of ore-ground in metallic mines is not for one moment to be compared in difficulty with the working of coal.

As I have already stated, the modes of working coal vary almost infinitely, and have been, and are still, the subject of most lively controversies. The system most generally adopted is that of the "pillar and stall," or "board and pillar," which consists in working away a certain portion of the coal in the first instance, leaving the remainder in pillars sufficient to support the roof, which are to be permanently lost, or totally or partially removed at some future time. As Mr. Hedley says, in his work on "Colliery Mining," it is the form of these pillars, and the proportion of the coal eventually to be obtained, which cause so much controversy, and in which are involved such momentous interests, not merely for individuals, but for the future of the nation. Where this system is adopted with the eventual design of removing the whole, or nearly the whole of the pillars, the proportion of the coal got in the first instance is made chiefly to depend on collateral considerations, being varied principally

to suit the nature of the roof, the character of the coal for working, and not unfrequently the requirements of other parallel seams. The present system of working large collieries is to "cut out" the seam worked in this manner, of which a notion may be formed from the drawing, from the shaft to the boundaries, and then, working backwards from the boundaries to the shaft, to remove the pillars in whole or in part. In those portions where the pillars are removed, the roof falls in, and the "goaf" is formed. This goaf, or abandoned part of the mine, is really the great danger with which colliery workings have to contend; it cannot be ventilated, and becomes consequently the receptacle of noxious and dangerous gases. The main object is to cut off the goaf as much as possible from the other workings of the mine, and, consequently, the system now generally adopted, of first cutting out the coal to the boundary, and taking away the pillars from thence, by which the goaf is left entirely behind, is a great improvement upon the old system, where a goaf was sometimes made in the middle of the workings, thus forming an enemy in the rear, cutting off retreat between existing workings to the shaft.

**TRANSPORT OF THE MINERAL PRODUCE AND MINERS TO THE SURFACE.**—This is a vast subject, upon which, however, I shall say little. For the reasons I have given—and I think they are valid reasons—the system of transporting minerals underground, and raising them to the surface, are less perfect in metallic mines than in collieries. The commonest system of drawing in metallic mines is by the "kibble," which is nothing more than an iron bucket attached to a chain or rope swinging free in the shaft, without any guides whatever. In inclined shafts, one side has to be planked all the way down for it to drag upon. Such a mode of drawing was suitable enough, no doubt, to the days when only horse "whims" or "gins" were in use; but now that steam is universally employed for drawing from any depth, it seems to me that their use is not to be defended. Yet I am sorry to say that in most of the Cornish mines, including some of the very largest, they are still exclusively used. They are gradually giving place, however, to the "skip," made of wrought iron, and working in guides, which is undoubtedly an immense improvement. In justice to the managers of the mines, I must, however, state that the introduction of skips generally necessitates the "cutting down," or enlargement of the shafts hitherto in use, which is a very costly matter, and one which is not infrequently either impossible from financial considerations, or unadvisable for other reasons, such as a proximate termination of the lease. Under no circumstances do I apprehend that the systems of drawing or winding will ever be so perfect in metallic mines as in collieries. The shafts, except in a few rare instances, being necessarily sunk originally for the purposes of exploration, and being made to follow the varying dip, or "underlie," of the lode, can never afford the same advantages as those sunk vertically for the special purpose of working. Not but that I expect the systems of drawing in use in metallic mines will gradually improve, for which there is certainly scope enough; but I think, from the nature of the case, collieries will always lead the way.

In collieries, as everyone knows, the workmen are lowered and raised by the same means as the coal is raised. In metallic mines, on the other hand, except in a few where "man engines" are in use, the men have to descend and ascend by ladders. The waste of labour which this involves in deep mines—mines from 150 to 300 fathoms deep—is enormous, leaving out of the question the injurious effect it has upon the health. There is, I believe, no possible labour to which a man can be put more exhausting to the system than the climbing of a deep mine by ladders. In fact, nothing but habit could enable a man to do it. For depths of 100 or 150 fathoms, the task is not a serious one to a person accustomed to climbing, but depths of 200 or 300 fathoms are trying to the strongest men. The task of climbing from the bottom of Wheal Vor, for instance, a depth of 323 fathoms from the sur-



face, is really, for the labour expended, only to be compared to scaling some Alpine mountain, and to place such a task before a man after a day's work is clearly preposterous. As a matter of fact, in the deep Cornish mines not provided with man engines, only young, and consequently inexperienced, men can be found to work in the very deep parts. Experienced men—experienced as workmen, and also experienced as to the necessity of husbanding their strength, and not wasting it wantonly like boys—cannot be got to work in very deep places, at least if times are at all good and work plentiful.

But while one admits the evil, it is not so easy to suggest a remedy. Where the circumstances admit, or justify the employment of man-engines, they are employed, but yet there are not above eight or nine of them in the kingdom. The great desideratum would be to employ the same means as are used for raising the ore, and many schemes of this kind have been suggested, called "safety skips." There is a feeling among many agents in Cornwall that such machines might, with a reasonable degree of safety, be employed. But none have yet dared to incur the responsibility of adopting one, for if a serious accident were to occur, and the public mind became excited, a manager who adopted an innovation of this kind, might find himself in a very serious position.

**VENTILATION OF MINES.**—The air in mines, of whatever nature, soon becomes vitiated from various causes. The vitiation, however, principally arises from causes which may be classed in two categories: the subtraction of a portion of its oxygen by the respiration of the workmen, and the combustion of the lamps or candles; and the introduction and mixture of other gases discharged from the cavities of the neighbouring rocks, or arising from the decomposition of contiguous substances. In the case of metallic mines generally, the vitiation of the air is due almost entirely to causes of the first category—that is, the subtraction of the oxygen by respiration and combustion, coupled with the intermixture of any gases arising from the gunpowder used in blasting. In certain cases the air of metallic mines is corrupted by other causes, but these are exceptional, and speaking generally, one may say that, except in a very minor degree, the vitiation of the air of metallic mines is due entirely to the abstraction of the oxygen by respiration and combustion—just as the air of this room would become vitiated from similar causes.

With the combustible minerals, particularly coal, the case is very different. The same causes which vitiate the air of metallic mines are also in action here, abstracting the oxygen; but to these are added causes of the second category, arising from the introduction and mixture of other gases produced from coal, of a much more dangerous character. The principal of these gases are:—

Carburetted hydrogen, or "fire-damp," so fatally dangerous from its explosiveness. When mixed with atmospheric air in a less proportion than one-thirtieth, no effect is observable. When mixed with air in a proportion varying from one-thirtieth to one-fifteenth, the flame of a candle or lamp, lengthens and enlarges in proportion to the quantity of gas present. Those experienced in the matter can judge pretty accurately of the quantity of gas present by the state of the flame, and suspected workings are "tried for fire-damp" by this means. When the proportion of gas reaches one-fourteenth, the flame will propagate itself, but without any violent explosion. Above this point, the inflammability of the gas increases rapidly, up to between one-ninth and one-eighth, in which proportion the mixture arrives at its maximum explosive power. As the proportion of fire-damp increases beyond one-eighth, the mixture becomes less and less explosive until it reaches one-third, at which point it ceases to fire, and extinguishes the lamp. This gas is not in itself poisonous or destructive of life, unless where it occurs in such considerable quantities as not to leave sufficient atmospheric air to supply the oxygen necessary for respiration.

Carbonic oxide is a gas even more highly explosive than fire-damp, and, unlike the latter, is poisonous and fatal to

life in the highest degree. There can be little doubt that this terrible gas has caused a much greater loss of life than is generally supposed, by poisoning suffocation, it being calculated that 1 per cent. is fatal to animal life. The common notion, founded on the experience of carbonic acid gas, that where a flame exists life is also safe, does not apply to it, for in certain mixtures with atmospheric air a flame will burn without explosion, yet life be instantly destroyed. Mr. Dickinson, the Government inspector of the Manchester district, mentioned a case which occurred two years ago, within his own knowledge, in South Wales, where a large number of men and boys were killed, with lamps and candles burning in their hands, by gas which caused no explosion. He also mentioned a case where he himself helped to carry two men out of gas when their safety lamps were burning. Poisoning suffocation of this kind may, however, also be due to sulphuretted hydrogen, another highly poisonous gas.

Carbonic acid gas, or "choke-damp," forms in every class of mines as a result of respiration, combustion, and the blasting of powder. In coal mines especially, however, its great danger is as a resultant from the explosion of the fiery gases already named. Many, in numerous instances, only escape the explosion to be suffocated by choke-damp. When atmospheric air contains upwards of 8 per cent. of the gas, it becomes dangerous to human life. As the effect of this gas on the system is to a certain extent poisonous, its presence, in ill-ventilated mines, gradually undermines the constitution, even when in quantities so small as to exclude all danger of suffocation.

Such are the enemies with which miners have to contend. In the case of metallic miners the dangers are less striking, although for that very reason they may be more insidious; for there bad ventilation only kills gradually, and the mine-manager has no apprehension of an explosion which may draw upon him the scrutinising eyes of the kingdom in no very friendly spirit. But the position of a colliery—particularly one with a fiery seam—is one of constant danger and anxiety, at any time liable to a terrible accident which no one can guard against. As an instance of the terrible explosive power which may be generated by the production of these gases from apparently insignificant quantities of mineral, I may mention the case of the Hetton Colliery explosion, which was one of extraordinary violence. Mr. J. L. Bell estimated that the quantity of gas which caused it (which, from peculiar circumstances, was ascertainable) might, if carburetted hydrogen, be generated from 152lbs. of coal—or, if carbonic oxide, from 49lbs. of coke. He added, that the explosive force of this quantity of either gas would be equal to about 75 quarter-barrels of gunpowder, each barrel being 25lbs. This may help those unacquainted with the subject to realise the extent of the explosive matter hoarded up in our coal seams.

The general principles upon which the ventilation of all mines is carried out are essentially the same as those with which we are familiar in the ventilation of public buildings. They all rest on the well-known doctrine, that as we heat air we lessen its specific weight, or, in popular terms, we rarify it, so that it will ascend and replace the cooler air above it, and *vice versa*. As the temperature of the rocks, at a small depth below the surface, is not affected by the atmospheric variations of temperature, it follows that in winter they are warmer and in summer colder than the atmospheric air, and the consequence is, that if a mine has two openings, one more elevated than the other, a natural circulation will arise by which in winter the air will enter at the lower and escape at the higher opening, and in summer enter by the higher opening and escape by the lower one. This would be the case if the temperature of the mine were the same in every part, but in a mine which is working this would never be the case, and, consequently, if even there were no difference between the levels of the two openings, currents would be created, and a natural ventilation result. In the case of metallic mines it is only necessary to open out



the ground by levels and winzes to create this natural ventilation, which experience has proved to be the best of all others. As the movements of the air caused by variations of temperature take place in a vertical plane, metallic lodes—being approximately vertical—easily maintain a natural ventilation. Sometimes in mines of this character, particularly in driving long levels upon which an air-shaft cannot be sunk, recourse is had to artificial ventilation, but in good mining this is only regarded as a temporary expedient, the end and aim of good management being to open out the mine as soon as possible, so as to get a natural ventilation. In driving long levels with but one air-shaft, a mode of ventilation is sometimes resorted to, as shewn by the drawing. The bottom of the level is covered with an air-tight "sollar," which extends nearly up to the forebreast of the level, and between the mouth of the level and the air-shaft an air-tight door is placed. The air in the level, heated by the combustion, &c., rises up the shaft and escapes, being replaced by fresh air, coming in under the solar, and passing in front of the forebreast. If there were no solar, the heated air would equally rise in the air-shaft, but then the current of fresh air coming in through the level would not have extended beyond this shaft, and would, consequently, not have aided in ventilating the forebreast of the level.

Although the natural circulation of the air, arising from the cause I have mentioned, is sufficient for effective ventilation in the case of metallic mines, it is not so in the case of the generality of colliery workings. The openings for the purpose of "cutting out" the coal being, generally speaking, made in a plane more or less horizontal, there evidently is no possibility of having the same natural ventilation as in the case of metallic mines opened out in an approximately vertical plane. Consequently, there must be artificial means of stimulating the circulation of air.

**THE FURNACE.**—The natural circulation of air in mines being influenced by differences of temperature, the most obvious mode of stimulating this circulation would be by increasing these differences artificially. If in the case of the air-sollar, already described, a fire were placed at the bottom of the air-shaft, it is evident that the circulation would be stimulated enormously, and in proportion to the depth of the shaft. This is the principle carried out in the ventilation of collieries when a furnace is employed. Distinct modes of exit and entrance for the air having been arranged, either by means of two separate shafts or by one shaft divided into two air-tight compartments by a brattice, the furnace is placed at, or as near as convenient to, the bottom of the shaft through which the air-current is to ascend, or the "up-cast" as it is called. The impure air which is withdrawn from the workings by this "up-cast" shaft, is replaced by pure air from the atmosphere which descends through the other, or "down-cast" shaft. The mode in which these furnaces are sometimes placed in the mine is shown by the drawing. I need scarcely say that the details of their arrangement, so as to cause as little inconvenience as possible at the bottom of the shaft, and to insure their being fed by air free from explosive gases, are various in the extreme, and require the exercise of the greatest judgment.

**MECHANICAL MEANS.**—The other mode of artificially stimulating ventilation consists of the application of mechanical means for drawing out the air. The machines hitherto used for this purpose have been of two kinds, one being essentially an air-pump, and the other a centrifugal fan. Time will not permit me to enter into the respective merits of these different contrivances; but, with regard to the respective merits of the furnace and mechanical appliances of any kind, I may state that the mining world is much divided on the question. For shallow pits mechanical means are, undoubtedly, better, although, like most things in this world, they present various practical difficulties.

The ventilating current being produced by either of

these means, it remains to regulate it, and distribute it through the workings so as most effectively to remove and dilute the noxious gases. It would take a volume to discuss, even in a general manner, the problems which are involved in carrying out this operation. The rate at which the currents should be made to pass—the area and extent of the air-courses and their resistances—the splitting of the currents, by which the quantity and quality of the air is improved, and the different divisions of the mine to a certain extent isolated, so as to minimise the danger in case of an explosion in any one division—are some of the most important. The drawing will give some notion how these matters are carried out in their simplest form.

Another principle of ventilation, which is as old as mining, and which has always been more or less practised, is to drive fresh air into the remote workings, instead of drawing out the vitiated air. There are circumstances where this may be usefully practised, but it has been demonstrated over and over again, that it is attended with great loss of power, from the well-known laws of pneumatics.

I have thus endeavoured, rather discursively I am aware, to give a general notion of the leading conditions affecting the working of mines. That they are conditions attended with enormous complications and difficulties, I think every one must admit; and that consequently those who carry out the working of mines are entitled to a reasonable amount of forbearance and consideration. Of every class engaged in industrial pursuits, mine owners are the most liable to casualties and accidents, against which no foresight or prudence can provide. They are liable to equal, if not greater risks, than the shipowner, without his power of insurance. To them serious accidents frequently mean ruin, and consequently it is absurd to suppose, as some seem to do, that mine owners are indifferent, if not callous, to accidents. It is undoubtedly the duty of the government to interfere to protect those who are liable to great dangers; and in most countries indeed it is held that the mineral property of a nation, being of an exceptional character—being a capital which once consumed can never be supplied—should be entirely administered by the State. However much such a notion may now seem repugnant to our ideas, it is by no means improbable, in certain districts at least, that some such arrangement must be ultimately resorted to. The majority of our collieries are worked on short leases, and under such circumstances it is unreasonable to expect works to be carried out in the style of those of a railway company. The building-lease system of London does not encourage a very permanent class of erections, so what can be expected in the case of twenty-one years' leases? Many landowners care little about the prospects of posterity, but make such arrangements as will ensure the largest present income—and lessees must act accordingly. If foreign Governments interfere incessantly with the working of mines, at least they protect them from grasping terms, which can only be complied with by a system of working injurious to the future; and they give a security for the investment of adequate capital, by insuring a continuance of a concession as long as certain defined terms are complied with. I have no objection to see Government interference, in the case of mines, largely increased; but I am satisfied it can only be usefully done by beginning at the beginning.

#### DISCUSSION.

Mr. G. R. BURNELL said they were much indebted to Mr. Salmon for bringing the whole subject of mining before them in the very agreeable way he had done, but he felt that the comparative merits of metalliferous mines and coal mines had scarcely been sufficiently dwelt upon. There were conditions affecting the two classes of mines which he thought it desirable for practical men to place before the world somewhat more in detail than had been done at present, so as to get rid of some of the misconception prevalent among the public. There was another

matter which he should have liked to have heard discussed, viz., the great increase of the temperature which occurred in proportion to the depth to which these great metalliferous mines were obliged to be worked. That was a question which bore very importantly upon the comparative rates of mortality amongst miners. Then, as regarded the question of coal mines, he regretted that Mr. Salmon had not alluded to the great subject which must be present to the minds of all classes—the late sad accident at the Hartley mine. That accident had naturally excited a great deal of feeling on the part of the public, who, under the inspiration of unpractical writers, were calling out loudly for the adoption of a uniform system of making two shafts to every mine. It was also important in these matters, that the public should be made aware that there was no universal law which could be laid down as rigidly applicable to every case. In the case of the Hartley mine, there could be no doubt that two shafts would have prevented the fearful loss of life that had occurred, but there were cases—as for instance in the mines near Whitehaven, where the workings were carried under the sea—and where it was impossible to have two shafts. All these cases, therefore, required to be treated upon their special merits, and no universal law could be laid down, and hence arose, in his opinion, the danger of Government interference. Government Inspectors, who had large districts to survey, could not spare the time to examine carefully all the practical details necessary to be known before any universal law could be laid down. They could only lay down general rules, and the effect of these general rules might be, as was the case on the Continent, to destroy the mining industry of the country. The result of Government interference in France had been what he had stated. Formerly there was a very important mining industry in Brittany—nearly as valuable as that of Cornwall—but at the present day it scarcely existed. In France no man could open a mine without a concession from the Government. The plans for the working must be sent in to the government, and the engineer was called upon to explain the workings from time to time. No miner was allowed to work without a species of examination. All this “cribbed and cabined and confined” the mining industry of a nation, and the practical result was that whilst they were very careful to protect the lives of the people in one way, they would not allow them to gain a living in the other. In his opinion the common sense of the matter, as far as law could interfere for the prevention of accidents, was to make the persons who got the greatest benefit from mining operations responsible in purse and in person for the accidents which might arise. They talked of the impossibility (with a lease of 21 years) of enforcing a proper and costly execution of the work. To his mind that was no excuse, for if the landowner got the benefit, he ought to be made to pay the consequences of his unjust pressure on the people who took a lease under him. Then, again, he believed there were many casualties which might be prevented if the managers and engineers of mines had a proper sense of their own responsibility, and this brought him again to the case of the Hartley Colliery, where the accident, as they knew, occurred from the breaking of the large balance beam of the lofty engine. A balance beam of that size ought, in his opinion, never to be made of cast iron, and certainly ought not to be worked over the only shaft of the mine, and therein he thought the engineer was to blame. Further, a shaft of that description ought never to have been entrusted simply to a wood curb. The bratticing was knocked away, the curb failed, and the ground at the back of the curb fell in. If that shaft had been lined with fire-brick or stone the accident would not have happened to the serious extent it did. He did not believe Government inspectors could do much. Inspectors could not lay down laws to suit all cases, and they could not always see that their instructions were carried out. He was sorry to see, by the newspapers of the day, that a Royal Commission had been named to inquire into the

circumstances of the Hartley accident. He believed a commission was not the best means of getting at the truth of such matters. The proceedings were conducted with closed doors; the evidence was not necessarily taken down in shorthand, and the whole of the evidence might not be published. He felt that, in all cases of this kind, the most proper tribunal for conducting such an inquiry was a Select Committee of the House of Commons, where everything was done openly and came before the public.

Mr. E. CHADWICK, C.B., said, in respect to commissioners, the gentleman who had last spoken was wholly misinformed, or informed only by prejudice, as to the procedure, which, when properly conducted, was the reverse of that described. The question between parliamentary committees of inquiry and commissions of inquiry was between inquiries by persons of distracted attention, limited in time to two or three hours a day once or twice a week—persons who were irresponsible, and an inquiry by persons who gave undivided attention from day to day, and who inquired by themselves or their assistants on the spot. The practical value of conclusions and legislation was as the time bestowed in examination and preparation. The comparative results left no doubt of the relative value of the two procedures when the procedure by the commission was properly conducted. On the more immediate topics of the paper, he could only repeat the expression of his conviction on one point, that little progress would be made in mining improvement, until the whole cost, the cost in excessive sickness and excessive mortality, as well as the cost of materials in all mining adventures, were charged upon the adventurers or upon the commodity, as it was just they should be. Until the cost of ignorance of the waste and devastation occasioned by recklessness was thrown upon those who used ignorant service, due exertions would not be made to obtain educated labour, as well as superior scientific service. It was an important fact to be borne in mind that when the causes of accidents were closely inquired into by competent persons, the great majority of them were found to be clearly preventible, the results of empirical management, or grossly ignorant labour. In this field of industry, as well as in some others, nothing was so wasteful as ignorance. It was true that proprietors suffered from accidents, but not enough; not the whole cost regularly attendant upon them. A large proportion of it was thrown upon others. In such cases as the dreadful accident which had recently shocked the nation, it was not doubted, by persons practically conversant with the subject, that if instead of the great expense of disaster being borne by others, it had been borne by the mine-owners themselves, such enterprises would not be undertaken without double shafts, recommended years ago by a parliamentary committee as a means of prevention, and not costly as a means of ordinary working economy. On the occurrence of calamities from explosive gases, the cause was frequently assigned to the recklessness of the miner, a man who, to light his pipe, would suck the flame through the wire-gauze of the lamp, or poke a hole into the gauze with his pick. The gross ignorance of much of the northern colliery population was matter of general observation. The Cornish miners had a higher degree of education, and their operations were not attended with the same proportion of fatal accidents. A friend, who was highly conversant with mining operations in every part of the country, expressed a confident belief, that had the accident of the Hartley Colliery happened to a body of the better-educated Cornish miners, he was quite confident they would have worked their way out, for the distance to be cut through was stated to be not more than some thirty feet. Instances might be given of important changes worked out, where the interest in better educated service was given, by charging upon the adventurers the whole of the consequences, and where precautions of a higher order of efficiency were adopted. The case of the educated man (stated in the paper) was the case of the man of inappropriate education, who was beaten by the man of better

though empirical, knowledge, obtained by constant undivided attention, which knowledge he had not the art of expounding clearly. This principle would avoid the use of prescribed universal conditions. Competent inspection of the dangerous processes, combined with the principle of interest in the results, would occasion the inspector to be regarded as an ally, bringing the knowledge, derived from wide observations of experience, in aid of the owners' objects. There was an example in Lancashire of an association of the owners of steam engines, for the prevention of boiler explosions, whose mode of procedure was to engage an inspector of their own to go about and examine their several engines, and report on their defects to the owners of the engines, as well as to the Association. This was an example of the voluntary adoption of the principle of inspection, and of its services to owners, amongst other things in warning them against the mismanagement of their capital in their engines by their servants. Intelligent workmen, too, now began to appreciate the importance of independent inspection, and to seek it for their own protection.

Mr. P. H. HOLLAND took a different view from that of one of the previous speakers on the subject of Royal Commissions. His own opinion was, that such a tribunal, being for the most part composed of men selected from their practical knowledge of the subject, was the proper one to deal with matters of this kind. His own experience of such bodies enabled him to state that evidence was taken before a commission at 'greater length, and the witnesses were allowed to explain their views more fully and more deliberately, than before committees of the House of Commons. He was gratified to find that a gentleman of Mr. Salmon's large practical experience in mining took the view which he (Mr. Holland) had long entertained, that the best way of preventing accidents in mines was to make the persons who derived the profits responsible for the consequences of the accident. The question of two shafts in all mines was one which doubtless must in a great degree be regulated by local circumstances and conditions; but he thought the government inspectors ought to have power to order anything which was practically necessary, with a view to the prevention of accidents in mines. As the law stood at present, the inspector might give directions for a thing to be carried out, but he had no power to enforce it. What he would suggest was, that the owner should either be compelled to adopt the practical suggestions of the inspector, or refer the question to impartial arbitration. It was true, that under the present system an arbitration was provided for, but it could not be considered impartial. The owner had the power of nominating five persons, out of whom the Secretary of State selected one to arbitrate between the owner and the inspector. The owner would of course take care to nominate five persons holding the same view as himself, and, therefore, so long as the present system of arbitrating on these matters existed, there was little chance of the inspector's office being a practical good. In the case of the Hartley Colliery, if the inspector had ordered a second staple to be constructed between the upper and the middle seam, all the men except those killed by the fall of the beam would have been saved. But if the inspector had ordered it he knew he had no power to compel its being carried out, and such men did not like to be beaten. A little amendment of the law would remedy that matter, and he believed would effect a vast deal of good. There were two or three matters in the paper which he would briefly notice. The first was with regard to the annual addition to the wealth of the country from its metallic productions, which Mr. Salmon had estimated at  $4\frac{1}{2}$  millions. From that should be deducted the cost of working, which might be taken at about three millions, so that the actual addition to the national wealth was reduced to about one and a half million, instead of four and a-half millions, and it should be borne in mind that the cost of working many mines was sometimes more than the produce from them realised.

They had been told that the miners in Cornwall had ventured to raise the men by machinery. He believed three or four man engines were employed, and they worked well, though they were rather expensive. Only one accident had taken place, and that was the man's own fault, and the managers of the mine could not be responsible for that. There was every probability that that plan would be more extensively used. They had been told that explosive gases, when not in sufficient quantity to explode, were not injurious to those who breathed them. That was not quite true, for all knew the effect of breathing the atmosphere of a room when an escape of gas took place; a headache certainly followed, and a headache showed that some injury to the system was taking place. He had no direct evidence to prove that breathing explosive gases short of choking was fatal; he had nevertheless no doubt as to its being injurious. After an explosion of gas in a mine it was well-known that a great number of people were killed, and it was generally assumed that carbonic acid gas was the destructive agent, but that was not always the case. The great cause, no doubt, was the absence of the oxygen of which the air had been deprived by the explosion, and the men were so to speak drowned. But there was another cause of death in mines more frequent than that. There was the effects of dust. This was found to be the case to a considerable extent in the case of the Riscar explosion, by which 140 persons were killed. On examination of the bodies of several of the sufferers, it was found that their mouths were full of coal dust, by which they had been literally choked, and it appeared that others had employed their handkerchiefs, or something of that kind, to keep the dust out of their mouths. Mr. Holland next referred to the subject of the men mounting by ladders, and remarked upon the instances of great physical exhaustion he had witnessed after men had reached the surface from a depth of 300 fathoms and upwards, and he then proceeded to speak of the effects produced upon the health of miners from working in badly ventilated mines. In some analyses which had been made by Mr. Hunt, it was shown that the air in some mines had been deprived of oxygen to an extent equal to one respiration through the lungs, and even more, and men were thus working in an atmosphere in which a candle would scarcely burn. He referred to the great prevalence of consumption amongst the metallic miners of Cornwall, which he attributed in a great measure to the impurity of the air they breathed, in contrast to the result upon the miners in the north, where the workings were better ventilated. In the better ventilated coal-mines, the deaths from consumption were not generally above the ordinary average of other occupations. He did not attribute those results to the influence of the metals upon the atmosphere of the mines, so much as to the want of proper ventilation, inasmuch as women and children employed in the manipulation of the metal on the surface, were not particularly affected by consumptive diseases.

Mr. Wm. HAWES said the paper they had heard read must have interested all present, but it struck him forcibly that, whilst it narrated a certain number of dangers to which miners were exposed—some producing sudden death and some a gradual death—there was a certain class of accidents which had been unnoticed, and it was not till he came to the end of the paper, that he understood how it was that a gentleman who had so perfect a knowledge of the subject, and had placed it before them in so pleasing a form, had omitted to notice that class of accidents which far more than any other were preventible. The last paragraph, however, explained the omission. It was clear that when accidents occurred from explosion, or where there was a gradual extinction of life by suffocation, they might be considered as almost unpreventible, whilst those arising from fracture of machinery, bad ventilation, or from ignorant arrangement of the ventilation, were all capable of remedy, and in the last paragraph he found Mr. Salmon urged the necessity of government interference to overcome many of the difficulties with which mining was at present surrounded.

He (Mr. Hawes) believed if there was anything more likely than another to increase those difficulties, it would be the admitting direct government action and interference with mining operations, as would be the case in any other branch of national industry. But they might have a certain amount of inspection over mines, as they had over factories and over the administration of the poor-laws. That the reasonable recommendations of the inspectors, if not attended to, should bring serious results to the owners, was one thing; but to appoint a body of inspectors to whom should be delegated the authority of saying a certain thing must be done, was taking out of the hands of a great industry of this country that power of independent action without which no industry could be successfully worked. Let him apply this to the observations of some of the speakers that evening. His friend, Mr. Chadwick, had told them that the colliers in the north were the most uneducated class, whilst the workpeople of Cornwall were the most educated class of miners. [Mr. CHADWICK—Comparatively.] But the gentleman who spoke last had told them that, so badly were the Cornish mines ventilated, so ill-provided were they with fresh air, so little interest did the owners take in the lives of their workmen, that the mortality amongst them was higher than amongst the uneducated and ill-provided-for colliers of the North. The contradictions of those two gentlemen indicated to him that they had not proper information on which to decide the question of interference one way or the other, and no man whom they might put upon the commission, unless he had served his time in the North and the West, was fit to deal with the question. Then they had placed before them various forms in which this interference was to take place. They were to have general orders. What did that mean as applied to mines? Then they were to have a tribunal of Inspectors, and an Act of Parliament to be enforced with penalties against the owners. These were other words for crippling an industrial energy, on which depended the mining interests of the country. He was quite of opinion that they could not throw too much responsibility upon men engaged in commerce of any kind; make them responsible for any inattention or wilful neglect, or want of proper care for the lives of the men they employed; and then everything that was required would be done in the best and most economical manner. They might apply the same rule to the managers of mines as was applied to railway directors, who were made responsible out of their own pockets, and the pockets of the shareholders, and they would thus have a direct interest in the prevention of accidents. He (Mr. Hawes), therefore, said, hold the owners responsible for any cases of gross neglect, and there would be greater care to protect their men against accident than would be the case under a system of Government inspection. He would add that he never lost an opportunity which presented itself of protesting against Government interference with trade; and whilst the great accident at the Hartley colliery enlisted the sympathies of the great mass of the people of this country, let them beware that such sympathies did not lead the way to a system of Government interference which would crush the best industrial energies of the nation.

Mr. WARINGTON SMYTH, F.R.S., begged to recall the attention of the meeting to the excellent paper of Mr. Salmon, because he thought the object of that paper had been misunderstood and was not fully appreciated. If they had attended more to the varying circumstances which that gentleman had placed before them, in respect of the differing conditions of mines, he thought a very great deal of discussion upon generalities might have been avoided. If that had been done they would not have heard so much said about having more than one shaft to every mine, or the unfair comparisons between the miners of Cornwall and the colliers of the north—if they had kept before them the facts which had been introduced to their notice in the paper. With reference to the numerous shafts in some of the Cornish mines, as mentioned by a preceding speaker,

it was to be recollected that many of them were mere drifts, principally undertaken for exploring purposes in metalliferous mines; there was not the certain dead expense which was attendant on the sinking of the main shafts of a coal mine, and it was frequently the case that portions of a shaft more than paid the expenses of the sinking; and Mr. Salmon had pointed attention to the fact that the entire work in a metalliferous mine was a continuous exploration. Therefore they could not look for that perfection of mechanical arrangement which they looked for in collieries, where the great expense of sinking a shaft having been once overcome, the mechanical appliances were of a character best adapted for raising large quantities of mineral with a due amount of profit. The paper embraced so extensive a range of subjects that he thought it was unfair to complain of the want of details, such as had been adverted to by one or two speakers, and they must also remember that upon those details a great amount of importance was to be placed which could scarcely be measured by having passed before them in review the general tendency of mining operations, the object of the paper being merely to present a comparison of the two methods adopted. But with respect to some of the observations which had fallen, he must say some very strong misapprehensions appeared to be entertained in respect of some of those points, amongst others, that in mines worked beneath the sea they could not conveniently have more than one shaft, and the mines in Whitehaven were instanced as an illustration of this. He would say, having examined those mines officially, they were doubtless worked under difficulties, but were nevertheless admirably ventilated, and as far as human prudence could foresee, were worked in a very safe and satisfactory manner; and although there might be some inconvenience in carrying a shaft through the sea, there might nevertheless be more than one shaft on the land. There were several other openings in the crop of the measures on the land, whereby the current of air produced was, in the main air-roads, almost enough to blow the spectator along. He might mention that, in Cornwall, there were several submarine mines near the Land's End which were worked under the sea at very considerable depths, and in those cases they were not satisfied with one or two shafts, but they sometimes had half-a-dozen, far more indeed than would be dictated by a prudent sense of economy, and which had been undertaken principally for the purposes of exploration. The paper had touched upon a great number of interesting topics, and he thought their thanks were due to Mr. Salmon for having placed before them the contrast of conditions under which the two classes of mines were worked. As regarded the last paragraph of the paper, it was an extremely suggestive one. Much might be said for and against governmental inspection. He had witnessed the gradual spread of that system—commencing with two commissioners, then adding two inspectors, who were again increased to six, and these subsequently to twelve, until they had them established in all parts of the coal mining districts of the country. He believed a considerable amount of good had been effected by those inspectors, not so much by their actually going down into the collieries and personally introducing improvement, but because it was known that they might come at any moment, and many things were put in order with regard to ventilation and mechanical appliances which would have lingered on for years unattended to, if the owners had not had the fear of the inspectors before their eyes. He believed the extent to which the great staple minerals of the country, coal and iron, were worked, made it more important for the nation at large to look carefully into the mode in which these matters were managed. That simple question of the dimensions of the pillars, as compared with the quantity of coal removed, might not only give rise to controversy, but it was one also of considerable national importance. In districts where fuel was of the highest value, there

were hundreds of acres of coal entirely destroyed, simply from the fact of those pillars not having been duly proportioned to the space of coal removed, and they could not regard this in any other light than as a national loss; but whether it was possible to introduce a supervision like that on the continent, was another question—nor did he say that he thought it would be desirable to do so. They had heard that evening of the appointment of a Royal Commission to inquire into the metalliferous mines, but he believed, unless great caution was exercised in some of these matters, as much harm as good might be done by the interference of Government, when it was not absolutely necessary. In consequence of the increasing depth and difficulty under which coal mines were worked, he thought it might be advisable that the government should exercise a supervision to see that the mine was not exposed to danger, and on the other hand that the coal was not improperly wasted. But on the subject of accidents, he would say, let them be very careful in distinguishing between accidents which might be termed unavoidable, and those which were the consequence of a neglect of due precaution, or the neglect of cautions given. They had confounded the two cases together too much. Cases of explosion from the want of sufficient ventilation, or from neglect of discipline and the breaking of an iron beam which was believed to be equal to a much greater weight than it had to bear, ought, he thought, to be considered in a very different light, and the latter was amongst those accidents which human foresight could not have avoided; but the objection that had been taken to a cast iron beam, as such, was so preposterous to those who were acquainted with the matter that he would not waste words on the subject. If they looked at the object of the paper, which was to point out the distinctions between the two systems of mining, he thought they ought not to be so hasty to blame, but that something was often to be said in extenuation on account of the many difficulties under which coal owners laboured; and from the experience he had had amongst the managers of mines, he could say there were very few indeed who were not grieved to the heart when loss of life occurred from accidents, and who did not take every reasonable precaution to guard against such accidents in future.

Professor TENNANT believed that the system of Government inspection had been the means of saving a great number of lives. With regard to the loss of life from casualties in many operations the average was about 800 per annum. He believed but for Government inspection that number would have been increased to 1,000; therefore, if 200 lives per annum were saved it was an important subject to be taken into consideration. With regard to the paper itself, it afforded matter for discussion for half-a-dozen meetings. Upon the subject of the mental condition of the working-classes in the mining districts he could bear his personal testimony to the improvement which had taken place in that respect within the last thirty years. Still there was plenty of room for further improvement in that direction. The elementary works published on mineralogy showed that there were as many as 250 specimens already discovered in this country, and yet, if they asked miners to tell them the number, they would not comprise, probably, more than 50 or 60. Therefore, if any mining population possessed a little more elementary knowledge of chemistry, mineralogy, and geology, it would add much to their own happiness and the welfare of those who employed them.

The CHAIRMAN said it was now his duty to propose that the thanks of the meeting be given to Mr. Salmon for the interesting paper with which he had favoured them. In doing that he felt it his duty to observe, that the object for which the paper had been expressly written had been most admirably fulfilled. Mr. Salmon had professed to give them a general view of the relative merits of different systems of working metallic mines and collieries. On a subject so comprehensive, and involving so many points, it was quite evident that nothing short of an encyclopædia

could fully carry out every detail, but he must do the author of the paper the justice to say that he thought he had, in a very admirable, clear, and concise manner, given perhaps as much information of a general character as they could expect from a paper read within the limits of time allowed. With regard to the various points embraced in the subject, if the hour had not been so late he should have been glad to have gone into some of them with a view of making one or two comments—not so much upon the paper itself, as upon some of the remarks which had fallen in the course of the discussion. Much had been said on the subject of commissions. Upon that point he might be allowed to speak with some little authority, having himself acted on a commission upon an important mining affair: and he must say that that commission and commissions generally, so far as he was acquainted with them, had been well adapted for obtaining a vast quantity of detail which could not by possibility be brought before a committee of the House of Commons. Then as to the remarks respecting the great importance of minerals, especially coal, that was a point which must be impressed upon the public in every possible way. The increasing depth and difficulty of working mines was such that it would undoubtedly force the subject very much upon public attention; and he thought great service had been done by Mr. Salmon in bringing forward a paper like the present one, so suggestive of those various matters which required consideration. Allusion had naturally been made to that most lamentable calamity at the Hartley New Pit, in Northumberland; and here he would take occasion to say that although every one now perceived that two shafts would have prevented the fearful results of that accident, yet it was impossible, in the nature of circumstances, that every precaution against such an accident could have been provided against, or its necessity foreseen. Without entering into any details upon the prudence or necessity of a second shaft (for he, no doubt, must admit that if a second means of communication had existed it would have been more prudent) he (Mr. Sopwith) must be permitted to say that the accident, by its extent, and by the singular nature of its occurrence, was removed out of the category of those which were within the ordinary range of foresight. Much had been said about the responsibility of the owners, and here he must observe (and he spoke from an extensive acquaintance with owners and other parties connected with mines) that when an accident had happened, he did not think a greater responsibility could well fall upon them, than that severe loss of property which they suffered, in addition to that severe affliction and heavy grief which weighed them to the earth. They must not call too loudly in such cases for additional punishment. They must take into consideration the situation of those who suffered the ruin of their fortune—who like the rest of their fellowmen felt most acutely the misery and distress such occurrences produced. He would only make one further remark on this subject. It had been said that the poor men might have worked their way out of the mine. Mr. Coulson, one of the most able and experienced men in this kingdom in the sinking of mines, was unable, with all the skill and energy of the most brave workmen, to work his way in; how then could it have been possible for those who were buried under the ruins to work their way out? Imagine a castle to have fallen. If those brave men could only move two or three feet, or perhaps as many inches, in as many hours, how was it possible for those who were buried in the cellars and vaults to work through the superincumbent mass of ruins. Many points had been alluded to in the discussion. He did not dislike the discussion the more because it had wandered a little from the point. He thought that was the object of a paper of this kind—to open out a discussion of the subject in all its bearings, and to obtain the opinion of different classes of minds upon it. He must, however, say a word as to the intelligence of miners in the north as compared with those in the south. Coal mining was for the most part a laborious quarrying operation, whereas working in metallic mines was of a kind to

excite thought and reflection, and it was for that reason that they found in metallic mines the workmen really more thoughtful and intelligent. It was stated that in metallic mines the only means of bringing the men out was by rough mechanical contrivances, and that in Cornwall they were bringing them up without the aid of slides. He could say in all the mines under his direction the workmen were brought out of the metallic mines by slides. Mr. Warington Smyth knew that in no mines, whether coal or other, were the miners brought out in a more careful manner by the aid of the best machinery, than in the mines to which he had just alluded. Without, however, saying more upon these details, and even abstaining from a few observations which he wished to have made upon some larger matters of mining, he could not longer occupy their time, but would propose that they give a vote of thanks to the author of the paper for his excellent communication.

The vote of thanks having been passed,

Mr SALMON thanked the meeting for the manner in which the imperfect sketch he had placed before them had been received. No one was more sensible than he was of his need of their forbearance. The object of his paper had been so ably pointed out by the Chairman and Mr. Warington Smyth, that there was no necessity for him to occupy their time further on the same subject.

The Secretary announced that on Wednesday evening next, the 26th inst., a Paper by Mr. David Urquhart, "On the Art of Constructing Turkish Baths, and their Economy as a Means of Cleanliness," would be read. On this evening the Chair will be taken by his Grace the Duke of Wellington, K.G.

#### INTERNATIONAL PHILANTHROPIC CONGRESS. (CONGRES INTERNATIONAL DE BIENFAISANCE.)—SESSION OF 1862.

The International Philanthropic Congress has for its object the rational and progressive improvement of the physical, intellectual, and moral condition of the working classes and of the poor. It collects accurate information concerning their present state, and the successful or unsuccessful means employed for bettering it; it elicits the opinions of men who have devoted themselves practically to the welfare of their fellow-creatures, and thus gathers together the results of the experience of all nations, for the common benefit of all. It disavows all political or sectarian spirit; adopting philanthropy as a neutral ground where all parties and persuasions may work harmoniously.

The Council of the National Association for the Promotion of Social Science, in a special meeting held on the 22nd of November, 1861, unanimously adopted a resolution proposed by Henry Roberts, Esq., F.S.A., one of the Vice-Presidents at the Session of the Congress held at Frankfort in 1857, inviting that body to hold its next session in London, in conjunction with the Sixth Annual Meeting of the National Association.

A general committee has been appointed for carrying into effect the foregoing resolution. Among the influential persons whose names it includes, or who have promised their support, are the following:—The Duke of Marlborough, the Earl of Shaftesbury, the Earl Fortescue, the Earl of Ducie, Lord Brougham and Vaux, Lord Ebury, Lord Raynham, Lord Kinsale, the Right Hon. W. Cowper, M.P.; the Hon. Arthur Kinnaid, M.P.; Sir Stafford Northcote, Bart., C.B., M.P.; the Lord Mayor; Sir Thos. Phillips, F.G.S.; Sir Joseph Olliffe, M.D.; Samuel Gurney, Esq., M.P.; Edwin Chadwick, Esq., C.B.; Harry Chester, Esq.; Thomas Winkworth, Esq.; George Godwin, Esq., F.R.S.; Alexander Thomson, Esq., of Banchoory; and John Sutherland, Esq., M.D., F.R.S.

A committee of organisation has made the following arrangements in concert with the Executive Committee of the National Association:—

The use of Burlington-house having been granted for the London meeting of the National Association and the Congress, an office has been established at 12, Old Bond-street, where the members of the Congress will enter their names on arriving in London.

On payment of one guinea, they will receive a ticket admitting them to all the meetings of the Association and Congress, and to all the advantages open to members of the Association during the London session.

As the expenditure required for ensuring the success of the joint meeting of the National Association and Congress will far exceed any sum likely to be derived from the issue of tickets, donation lists will be opened, to which the members of the Association and Congress may subscribe.

The Session will be inaugurated on the 4th of June. Six days will probably be devoted to business. Arrangements will be made for visits to the Great Exhibition and other objects of special interest in or near the metropolis.

It is proposed to direct the special attention of the members of the Congress to those articles in the various departments of the Exhibition which may be most deserving of notice in a sanitary and benevolent point of view. It will be the province of the Congress to consider the expediency of recommending that the articles and inventions thus noted, be collected together at the close of the Great Exhibition, for constituting a special Exhibition of Domestic and Sanitary Economy.

Care will be taken to give to the deliberations of the Congress a character of practical utility, and to afford to every member an opportunity of fully expressing the results of his experience. At the same time, it is essential that in an international assembly, comprising persons whose views on ecclesiastical as well as on political questions greatly differ, such discussions as might wound the feelings of any of its members should be avoided.

Written communications should be in French or English. In oral communications, German or Italian may also be used by special permission.

At the close of the session, the Committee of organisation will be replaced by a special Committee for the publication of the Transactions, of which a copy will be placed at the disposal of each of the members. The Transactions of the National Association will be added on payment of 5s.

Before separating, the Congress will advise as to the best means of giving active development to the system of International Correspondence recommended at the Frankfort Session in 1857, and of thereby maintaining to the Congress a continuous existence, and insuring greater regularity in the convocation of its successive sessions.

The Programme of the Congress, which has lately appeared in French, and from which the foregoing information is derived, proceeds to explain the nature of the communications to be addressed to the Congress, giving at considerable length a classified enumeration of the subjects recommended to the attention of persons interested in promoting the improvement of the moral, intellectual, and physical condition of the people.

It may be mentioned as a proof of the interest taken on the Continent in the Philanthropic Congress, that 1,000 copies have been requested for France, and 200 for Belgium. Active co-operation is expected also from Germany, Switzerland, and Italy.

The Programme may be obtained, on application, at the office, 12, Old Bond-street, or to the Secretary of the Society of Arts.

#### THE ALPACA IN AUSTRALIA.

The Acclimatisation Society of Victoria have republished in the form of a pamphlet Mr. George Ledger's paper, read before the Society of Arts last session, and in the introduction to it they say:—



"All accounts, to the most recent, are in the highest degree favourable to the project of establishing this animal in Australia. The flock introduced into New South Wales has increased from 283 in 1859, to 417 in 1861. The small herd in the Melbourne Gardens has increased from 19 in 1859, to 45 in 1861, and in either flock casualties are almost unknown. The most favourable accounts have also been received of ten introduced, in 1859, into Queensland, and referred to in this pamphlet. 'No deaths had occurred, and the increase exceeded the most sanguine expectations.'

"In a recent communication, Mr. Charles Ledger states that, having several months since depastured a portion of his animals on lucerne, a portion on clover, and a portion on the natural grasses—that fed on the indigenous pasture was unquestionably in the highest and healthiest condition. One of those lately slaughtered for the Great Exhibition contained 22 lbs. of inside fat.

"Mr. Ledger also states that the superior pasture, and more scientific tending of the alpaca in Australia, produce a finer, larger, stronger, and in every way superior animal to any ever produced in South America; that the staple of wool is excellent, owing to the non-existence of such extraordinary transitions of climate as the animal is subject to in South America—three months of abundant grass, and nine of mere scanty pickings. One fleece sheared in Sydney, of twenty-one months' growth, weighed 26 lbs.

"The great adaptability of the alpaca to Australia is remarked upon, owing to its being a browsing animal as well as a grazing one. It feeds eagerly on shrubs and trees, and, if deprived altogether of grass, would subsist easily upon the coarser plants constituting our ordinary 'scrubs.'

"The flesh was recently experimented upon in Sydney, and favourable reports were made by the several hundreds who tasted it.

"To the successful acclimatisation among us of this animal and its congeners, the llama and vicuna, the Society look therefore with the greatest interest. It is impossible to say of what value it may become in after years, not certainly as superseding the sheep or any other stock now depasturing amongst us, but rather as feeding over the sheep's head, eating herbage that nothing else will eat, and from its little use of water being adapted to occupy millions of acres unfit for any other purpose.

"Indeed, it is of the utmost importance to recollect that it is quite possible that it may devolve upon Australia to develop this animal to a degree never yet imagined. It has been hitherto virtually monopolised by the South American Indian, one of the most unimproving of all the races of mankind, the most beset by traditionary prejudices and ridiculous superstitions, calculated in every way to cramp the intellect and prevent improvements. It remains to be shown what may be done with animals like these, now to be subjected for the first time to the same treatment that has effected such wonders with the Leicester, Lincoln, or South Down sheep, the short-horn ox, the thorough-bred horse, and other domestic animals long since brought under our control."

#### SOUTH STAFFORDSHIRE UNION OF EDUCATIONAL INSTITUTIONS.

A few months ago the second annual meeting of the above Society was reported in the *Society of Arts Journal*, but the account was rather gloomy than encouraging. Since that time, however, many important alterations have been made, and additional help has been obtained, so that those forebodings of ephemeral existence have, happily, been supplanted by others of a more healthy character.

This society, which has now been in existence about two years, will in future bear the name of an "Association for the promotion of adult education and evening schools." The means by which the Society endeavours to accomplish the objects defined by its title are, the establishment,

examination, and encouragement of classes for special instruction in the subjects prescribed annually by the Society of Arts; and the advancement by similar measures of the more general principles of education contemplated by evening schools and classes. The district within the limits of the association may be defined by the various towns, villages, and parishes within, or bordering on, the South Staffordshire coal field. All institutions intended for the education of adults within such limits, may be in union with the Association by the payment of half-a-guinea per annum, and evening schools by paying five shillings. Each institute in union nominates one of its members as representative, who is an honorary member of the society, and eligible for appointment to any of its offices. The Association consists of a president, treasurer, organizing agent, and hon. secretary; of representatives of institutions in union; of gentlemen who deliver at least two lectures a year on the terms prescribed by the committee; of the government inspectors of mines, schools, and factories within the district; of subscribers of at least half-a-guinea annually; and of donors of money, prizes, or other property to the value of five guineas in one sum. The affairs of that institution are managed by an executive committee, who are elected annually, and meet at intervals of about a month, alternately at Wolverhampton and Dudley. The committee appoint annually a local board to conduct the examinations in the principal towns of the locality. Visitors are also chosen to inspect any night school or institute where the managers are willing to receive them. An annual meeting is held in September, at some important place in the district, when the report is read, all prizes and certificates awarded to candidates distributed, and all other necessary business transacted.

The primary object of the association is the encouragement of evening classes, but it also offers many general advantages to Institutions in union. It provides lectures on reasonable terms; it promotes an interchange of privileges between the various Institutions, by arranging that the tickets of any society in union are accepted as free passes by other societies not in the same town; it secures a means of communication between Institutions, night schools, &c., by the employment of a regular agent, who is at all times ready to give advice and assistance in the management of such Institutions, both in their ordinary departments and special arrangements; it publishes an annual report, embracing the principal features furnished by each Institution during the year, and containing many suggestions and remarks calculated to assist educational movements. The organising agent visits regularly a limited number of Institutions, to organise their classes, and to promote the successful working of the same; attends public meetings to explain the operations of the society; assists in the establishment of new Institutions; holds private preparatory examinations of candidates, and local meetings for conference with night school teachers; and is, in general terms, the representative of the Association throughout the district.

The number of Institutions now connected with the Association is thirty-three, but an equal number still hold aloof for various reasons. But though the Association is treading on firmer ground, it is not yet out of difficulty. It wants a circulating library, diagrams for lectures, and more funds, so that it may be some years before it is able to develop all its plans. Still the managers are hopeful for the future now, and confident that when the next meeting takes place it will be seen that they have been labouring with success.

#### Home Correspondence.

##### USE OF APPLES IN DYEING.

SIR,—There has been an opinion prevalent, especially in the West of England, that apples have been extensively used in the application of some of the new and brilliant



dyes mentioned by Dr. Crace Calvert in his paper; and I have found many well informed men in the City, as well as the majority of the members of the Society of Arts to whom I have mentioned the subject, fully believe it. You will, perhaps, not think it out of place, in connection with the interesting paper read last night, to allow the *Journal* to be the medium of giving the assertion a distinct denial. Dr. Calvert has allowed me to use his name in stating that it is a complete hoax; but, to show the utility of giving publicity to this statement, he told me the rumour has obtained such general currency, that he has been called on in Manchester by persons who have been thus misled, and have involved themselves in some expense to supply the market with malic acid from some cheaper source, as, of course, may be easily done; but they have found, to their disappointment, that there is no market for the article. I am, &c.,

W. SYMONS.

17, St. Mark's-crescent, Regent's-park, February 6th, 1862.

#### LANCASHIRE AND INDIA.

SIR,—Some two years back I expressed in your *Journal* my conviction that, sooner or later, a very large portion of the cotton manufactures would leave Lancashire and return to that India whence they originally sprang. I was taken to task for it by a Manchester man, who desired to be informed when that exodus would take place.

Manchester now complains that the 10 per cent. duty put on by Mr. Laing will operate as a premium to foster Indian manufacturers in cotton, and that mills and machinery are there sprung up. Probably they are clear-headed Manchester men who have set them up.

If the 10 per cent. duty is to ruin the Lancashire trade, what will be the result of the 800 per cent. cheaper wages for mill-hands—3d. compared with 2s.? Will any European or American country be able to compete with India till such time as demand shall have raised Indian labour to a level with European—after Europeans shall have engrafted mills and machinery upon indigenous aptitude.

Are we to regret this—that another portion of the Empire of Great Britain shall enable us to outstrip in cotton the manufactures of the whole world—that the manufacturer leaves a portion of our empire, where it is exotic, to become firmly established where it is indigenous? We may and must regret the misery resulting from a change, even when the change is inevitable, even as we sorrowed over the painful misery of our hand-loom weavers, but we cannot alter the course of nature. The revolution in the American cotton supply is but a prelude to a greater revolution here. London will probably become the emporium—the great European storehouse, for the distribution of Indian bales of manufactured cotton over the whole Continent, and Manchester will replace the deficit of cotton by a surplus of iron. While India was a dependency, and not even a colony, the laws of nature might be inoperative, but as a part of the empire, with disabilities removed, if it will pay to produce cotton, *a fortiori* it will pay to spin and weave it by indigenous labour, and thus, so far as India itself is concerned, save two freights as well as seven parts in eight of the labour cost. The most profitable business for the whole community is, when every man, or class of men, and material, is employed according to natural aptitude.

We do not compete in the production of wine with Spain, or Italy, or Portugal, though we grow in hot-houses the finest grapes in the world; and assuredly we shall not compete with India for cotton fabrics, when machinery is at par and labour eight times dearer in England.

I am, &c.,

W. BRIDGES ADAMS.

#### MEETINGS FOR THE ENSUING WEEK.

Mon.....Roy. Geographical, 8½. 1. The Hon. H. P. Vereker, H.B.M. Consul at Rio Grande do Sul, "Report on the Brazilian Province of the Parana." 2. Mr. G. R. Perry, H.M. Vice-Consul for that State, "The Republic of Nicaragua." 3. Capt. Bedford Pim, R.N., "Proposed Transit route through Central America, by way of Nicaragua."

Actuaries, 7.

Medical, 8½. Mr. Henry Thompson, F.R.C.S. Lettsomian Lectures.—3. "Lithotripsy:—its practical application. Appreciation of all the mechanical methods for the removal of stone from the male bladder."

Civil Engineers, 8. Renewed discussion upon Mr. Joseph D'A. Samuda's paper, "On Iron-Plated Ships."

Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."

Wed. ...Society of Arts, 8. Mr. David Urquhart, "On the Art of Constructing Turkish Baths, and their economy as a means of cleanliness."

Geological, 8.

Royal Soc. Literature, 4½.

Archæological Association, 8½.

Thurs. ...Royal, 8½.

Antiquaries, 8½.

Philological, 8.

Philosophical Club, 6.

Royal Inst., 3. Professor Tyndall, "On Heat."

Fri. ....Royal Inst., 8. Mr. A. E. Durham, "On Sleeping and Dreaming."

Sat. ....Royal Inst., 3. Mr. Henry F. Chorley, "On National Music."

#### PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, February 14th, 1862.]

Dated 8th October, 1861.

2512. I. Evans, jun., Cefn Mawr, Ruabon, Denbighshire—An improved miners' lamp.

Dated 7th November, 1861.

2797. T. Schwartz, New York—Imp. in the construction of air engines or air motors.

Dated 9th November, 1861.

2811. D. Cowan, Hungerford-street, Strand—Imp. in the construction of pneumatic subaqueous tubes for passenger and goods traffic, and in machinery for the manufacture thereof.

Dated 21st November, 1861.

2923. J. H. Jeffs, Tottenham-court-road—Imp. in the manufacture of collars, shirt-fronts, cuffs, hats, bonnets, vests, and other articles of wearing apparel.

Dated 2nd December, 1861.

3023. W. P. Bain, Blackwall—Imp. in protecting ships' bottoms from fouling.

Dated 9th December, 1861.

3079. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Improved natatory apparatus. (A com.)

3080. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—A new or improved combination of microscopic photographs and lens. s with certain precious stones or imitations thereof. (A com.)

Dated 21st December, 1861.

3205. T. Morris and R. Weare, Birmingham, and E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in submarine and other telegraphic communication, and in apparatus connected therewith.

Dated 31st December, 1861.

3273. J. B. Cretal, Saint Malo, France—A new process of colouring smoking pipes.

Dated 6th January, 1862.

39. A. V. Newton, 66, Chancery-lane—An improved manufacture of cigars. (A com.)

Dated 8th January, 1862.

58. H. Cook, Manchester—An improved mode of, and apparatus for, transmitting despatches and small articles by the agency of electricity. (A com.)

Dated 9th January, 1862.

66. J. H. Tatum and W. J. Williams, Arundel-street, Strand—Imp. in the manufacture and structure of wicks, and in the application of the same to the manufacture of candles.

Dated 10th January, 1862.

78. L. Petre and E. S. Tucker, 194, Waterloo-road—The application of velvet, plush, cloth, leather, American cloth, oil cloth, and other such like substances, alone and in combination with other materials, for advertising show boards, show cards, window tickets, and all such uses.

Dated 11th January, 1862.

81. T. Ramsay, Newcastle-upon-Tyne—Imp. in the manufacture of coke.

Dated 14th January, 1862.

108. T. Harrison, Birmingham, and J. G. Harrison, Kirby Ravensworth—Imp. in ploughs.

Dated 15th January, 1862.

113. W. Cleland, 39, St. George's-hill, Everton, Liverpool—Imp. in treating and utilising certain materials used and products obtained in the manufacture of gas, and in apparatus connected with the said treatment.

Dated 17th January, 1862.

123. T. Myers, 41, Bloomsbury-square, and E. Myers, 56, Millbank-street, Westminster—An improved composition for preventing rust on bright steel, iron, brass, or metal surfaces.

124. R. Dunlop, Cwm, Avon, Taibach, Glamorganshire—Improved means for facilitating calculations.

*Dated 20th January, 1862.*

141. L. Barbat, 4, South-street, Finsbury—A new and improved fabric applicable to the manufacture of hats, bonnets, and other like articles.

*Dated 23rd January, 1862.*

169. J. Hinks and A. Dixon, Birmingham—A new apparatus for warming and drying boots, shoes, or slippers, which apparatus is also applicable for racking or storing boots, shoes, or slippers, for exhibition or otherwise.

170. J. A. Mays, 30, Regent-square—Imp. in envelopes and other wrappers.

175. H. Owen, Albert-terrace, Islington—Imp. in the manufacture of stockings and other articles of hosiery.

*Dated 27th January, 1862.*

205. J. Lillie, Duke-street, Adelphi—Imp. in the method of protecting ships' bottoms from fouling, and in materials to be used therefor.

*Dated 28th January, 1862.*

214. H. H. Treppass, 14, St. George's-terrace, Barnsbury-park—Imp. in the construction, use, and employment of the kaleidoscope.

226. W. E. Newton, 66, Chancery-lane—Imp. in engines to be employed by pumping or forcing air or water, and for other purposes where a rectilinear motion is required. (A com.)

*Dated 29th January, 1862.*

231. F. D. de Boutteville, jun., Fontaine-le-Bourg, France—Imp. in machinery applicable to the spinning of fibrous substances.

234. T. Meriton, 3, Leadenhall-street—Imp. in marine and other boilers for generating steam.

239. W. E. Newton, 66, Chancery-lane—Imp. in printing machinery. (A com.)

241. G. Bedson, Manchester—Imp. in wire fences.

*Dated 30th January, 1862.*

243. G. Phillips, sen., and G. Phillips, jun., 89, Holborn-hill—Imp. in the distillation and rectification of alcohols or spirits.

244. M. Allen, 14, Worship-street—Imp. in the construction of buildings for the prevention of fire, and in the materials to be employed therein and therefor.

245. T. Gontard, 16, Rue des Vieux Augustins, Paris—Improved truss plates producing an upward pressure.

247. J. Firth, Heckmondwike, near Leeds—An imp. in finishing mohair cloth.

*Dated 31st January, 1862.*

253. D. Littlehales, Brearley-street West, Birmingham—An improved plastic compound as a substitute for papier maché.

255. J. Silvester, West Bromwich—Imp. in pocket and other spring balances.

256. F. Baggett, Birmingham, and J. Sanger, Aston, near Birmingham—An imp. or imps. in breech-loading small arms.

258. J. Dodge, Little Portland-street—Imp. in C springs for carriages when used without a perch.

259. W. Walton, Manchester, and F. Walton, Chiswick—Imp. in the manufacture of wire cards.

260. G. Mehrtens, 27½, Charles-street, Hampstead-road—Imp. in ladies' stays, and in the bodies of ladies' dresses.

261. J. Hargreaves, 12, Clifton-cottages, Clifton-road, Peckham—Imp. in the manufacture of pipes or tubes for conveying water, gas, acids, sewage, enclosing electric telegraph wires, and for other purposes, which imps. are also applicable to the manufacture of other vessels and articles, and in the machinery or apparatus connected therewith.

263. C. Pontifex, jun., 55, Shoe-lane—Imp. in apparatus for cooling or heating fluids or liquids.

267. A. Forsyth, Glasgow—Imp. in the manufacture of frames and in tablets used for advertising purposes.

268. C. Veronique, Rue Thaitbout, France—An improved wrapper garment.

*Dated 1st February, 1862.*

270. L. Fauvel, Paris—Imp. in apparatus for indicating the existence of escapes in gas tubing, and for stopping the continuance thereof.

271. R. Burkhardt and C. Doebler, Manchester—Imp. in æolian harps.

275. F. W. Dachne, Swansea—Imp. in furnaces used in the manufacture of zinc.

276. T. Cook, Coburg-road, Old Kent-road—Imp. in machinery for punching, cutting, and pressing metals and other materials.

277. J. Harris, Store-street, Tottenham Court-road—Imp. in mattresses, squabs, pillows, and other like articles of furniture.

278. T. Cook, Coburg-road, Old Kent-road—Imp. in machinery for folding envelopes.

280. F. Riesbeck and W. Becker, Aldermanbury—Imp. in locks or fastenings for bags, portemonnaies, and other like articles having metal frames.

*Dated 3rd February, 1862.*

282. L. Hill, Port Glasgow—Imp. in applying armour plating to war ships.

284. C. W. Lancaster, New Bond-street—Imp. in strengthening cast-iron ordnance.

286. J. J. King, Chase-lodge, Lavender-hill, Wandsworth-road—Imp. in the fastenings of bedsteads, which fastenings are also applicable to other portable framework.

287. W. E. Newton, 66, Chancery-lane—Imp. in machinery for spinning. (A com.)

*Dated 4th February, 1862.*

290. G. Manwaring, Southampton—Imp. in flushing apparatus for closets, sewers, and other water services.

293. J. L. Norton, 38, Belle Sauvage-yard, Ludgate-hill—Imp. in beating, stretching, and drying fabrics, and in the apparatus employed therein, part of which apparatus is also applicable for thrashing linseed. (Partly a com.)

295. J. Greenwood, Portland Mills, Bradford—Imp. in means or apparatus for preparing and combing wool and other fibres.

297. J. Webster, Birmingham—Imp. in gas fittings.

*Dated 5th February, 1862.*

299. D. Gallafent, 15, Stepney Causeway—Certain imp. in the mode or modes of generating or producing elastic vapours to be used as a motive power.

300. W. E. Taylor, Enfield, near Accrington—Certain imp. in carding engines.

301. J. King, Chadshunt, Warwickshire—Imp. in lubricators for lubricating the moving parts of machinery.

302. E. F. Smith and T. Swinnerton, Dudley—Imp. in the manufacture of coke, and in kilns or ovens for the manufacture of coke.

303. J. Browning, Minories—Imp. in aneroid barometers.

304. H. Ashworth, Littleborough, Lancashire—Certain imp. in machinery or apparatus employed in spinning cotton and other fibrous substances.

305. E. Harrison, Oldham—A certain compound or certain compounds to be used as a substitute for gunpowder.

307. J. Lee, Church-gate, Leicester—Imp. in traction engines.

308. J. B. Payne, Chard, Somersetshire—Imp. in the treatment or preparation of hemp, flax, and other analogous fibrous substances for spinning.

309. A. V. Newton, 66, Chancery-lane—An imp. in fire-arms. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

357. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in smoothing irons. (A com.)—11th February, 1862.

PATENTS SEALED.

[From Gazette, February 14th, 1862.]

*February 14th.*

2058. W. H. Smith.  
2060. W. Firth.  
2061. T. Pedrick.  
2064. A. S. Rostaing.  
2066. H. Ems.  
2069. S. Whitaker and R. A. Jones.  
2092. T. Grahame.  
2107. A. B. Childs.  
2132. E. Peltier.  
2162. J. S. Matthews.

2169. W. Hensman and W. Hensman.  
2201. W. E. Newton.  
2261. J. Bowns.  
2287. M. A. F. Mennons.  
2453. A. Wyley.  
2607. J. Webster.  
2665. J. McCall and B. G. Sloper.  
2725. W. Cook and H. Cook.  
2900. G. Parry.  
3031. G. T. Bousfield.  
3124. W. Bell.

[From Gazette, February 18th, 1862.]

*February 18th.*

2057. E. S. Cathels.  
2067. R. A. Brooman.  
2071. J. Somerville.  
2075. F. Gye.  
2086. N. Salamon.  
2089. J. M. Murat.  
2096. J. H. Johnson.  
2100. L. M. Casella.  
2108. S. Elson.  
2114. M. Hyams.  
2120. R. W. Jones.  
2159. A. Jaille.

2168. W. Clark.  
2185. W. Clark.  
2223. M. A. F. Mennons.  
2224. M. A. F. Mennons.  
2234. M. Henry.  
2258. L. P. Barré.  
2954. G. Lowry.  
2961. A. V. Newton.  
3005. J. D'Adhemar de Labaume.  
2043. W. H. Balmain.  
3047. A. T. Carr.  
3098. W. E. Newton.  
3153. G. Davies.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, February 14th, 1862.]

*February 10th.*

401. G. Betjemann, G. W. Betjemann, & J. Betjemann.  
*February 11th.*  
404. H. Gardner.

412. J. L. Clark.  
435. J. J. Russell.  
439. J. Breeden.  
461. C. Garton.

[From Gazette, February 18th, 1862.]

*February 13th.*

505. J. H. G. D. Wagner.  
*February 14th.*  
408. J. Parkinson.  
427. R. Cookson and C. W. Homer.

468. G. Paul.  
*February 15th.*  
440. J. Enson.  
445. P. E. Fraissinet.  
446. T. Cattell.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, February 14th, 1862.]

*February 11th.*

355. S. B. Wright and H. T. Green.